

Optimizing Carbon Dioxide Sequestration Using Olivine and Sodium Hydroxide in a Flow Through System

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Commercially viable carbon dioxide (CO₂) sequestration with magnesium silicates, such as olivine, is still primarily experimental. My previous research showed a closed system containing olivine and sodium hydroxide (NaOH) sequesters CO₂. However, the ideal concentration of NaOH, and whether sequestration via this method is possible in a commercially viable flow through system has not been determined. This experiment tests the hypothesis that a flow through system is possible and that higher concentrations of NaOH will be more effective at CO₂ sequestration. Treatments of olivine combined with 0M, 0.1 M, 1M, and 2M NaOH were placed in a pipe through which a mixture of 5000 ppm CO₂ was bubbled through for 10 minutes. Treatments without olivine of the same NaOH concentrations were also tested. The ppm of CO₂, from the outlet of the tube was measured to determine the amount of CO₂ sequestered. Data collected showed an exponential decrease in CO₂ as the NaOH concentration increased. Another four trials were conducted, lasting 2+ hours, using the 2M NaOH +olivine treatment to see how well the treatment could sequester CO₂ over a longer time period. In these trials, CO₂ levels increased over time due to decrease in NaOH concentration. In conclusion, this experiment shows it is possible to sequester CO₂ via NaOH and olivine in a flow through system and the best method of CO₂ sequestration tested was the combination of 2M NaOH and olivine. However, new NaOH solution has to be added to maintain optimal sequestration rates over longer time periods.